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12
                        UNITED STATES DISTRICT COURT
13
                      NORTHERN DISTRICT OF CALIFORNIA
14
                          SAN FRANCISCO DIVISION
15

16   ORACLE AMERICA, INC.,   Case No. 3:10-cv-03561 WHA (DMR)

17   Plaintiffs,
                                            CORRECTED EXHIBIT F TO
18   v.   DECLARATION OF EDWARD A. BAYLEY
                                            IN SUPPORT OF GOOGLE INC.'S
19   GOOGLE INC.,   MOTIONS IN LIMINE NOS. 1-6.
                                            PART 1 OF 5
20   Defendant.

21   Hearing: April 27, 2016
                                            Dept.   Courtroom 8, 19th Fl.
22   Judge: Hon. William Alsup

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964206.01

EXHIBIT F

REDACTED VERSION OF DOCUMENT SOUGHT TO BE SEALED

OCEAN TOMO
INTELLECTUAL CAPITAL EQUITY

ORACLE AMERICA, INC.
v.
GOOGLE INC.

CASE NO. CV 10-03561 WHA

EXPERT REPORT OF JAMES E. MALACKOWSKI

[CORRECTED]

January 8, 2016

INTELLECTUAL CAPITAL EQUITY

INTELLECTUAL CAPITAL EQUITY

1.   FIRM BACKGROUND AND QUALIFICATIONS

1.   My name is James E. Malackowski and I am the Chairman and Chief Executive Officer of Ocean Tomo. Ocean Tomo provides financial products and services related to intellectual property, including expert testimony, valuation, strategy consulting, proprietary research products, investment services, risk management products, innovation management services and transaction brokerage.

2.   Prior to forming Ocean Tomo, I served as a finance and investment advisor working with one of the nation's oldest investment banks as well as one of Chicago's largest private equity firms. I began my career by spending fifteen years as a management consultant and forensic accountant focused on intangible assets. In this capacity, I served numerous roles as a founding principal including Chief Executive Officer of my prior firm.

3.   I have served as a consultant for clients and counsel on business valuation issues as well as all phases of the technology transfer process. I have experience as a Board Director for leading technology corporations as well as companies dealing with brand management issues. I have served in a leadership role with numerous corporate and not-for-profit entities. I am a Past President of The Licensing Executives Society International, Inc., as well as its largest chapter, LES USA & Canada, Inc.

4.   Today, I focus my non-for-profit efforts with organizations leveraging science and innovation for the benefit of children or lesser developed countries. I am a Director of Children's Memorial Research Center, an affiliate of Children's Memorial Hospital in Chicago and have served since 2002 as a Trustee or Director of Invent Now, Inc., an organization providing summer enrichment programs for more than 80,000 students annually. I am the founder of the Chicago based Center for Applied Innovation (CAI), an Illinois nonprofit corporation created to manage education, public policy outreach and related economic activity around applied technology and intellectual property rights with a focus on technology transfer to lesser developed countries.

5.   I am a founding and continuous member of the IP Hall of Fame Academy. The IP Hall of Fame was developed by Intellectual Asset Management (IAM) Magazine to honor the achievements of men and women who have made an outstanding contribution to the development of today's IP system and its role as an enhancer of lives across the world. Inductees are chosen each year by the IP Hall of Fame Academy from nominations sent in by members of the global IP community.

6.   I have been recognized annually since 2007 by leading industry publications as one of the fifty most influential people in intellectual property and/or one of the "World's 300 Leading IP Strategists." In 2011, I was selected by the World Economic Forum as one of fewer than twenty members of the Network of Global Agenda Councils to focus on questions of IP policy. In 2013, I was inducted into the Chicago Area Entrepreneurship Hall of Fame by the Institute for Entrepreneurial Studies at the University of Illinois at Chicago College of Business Administration.

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7.   I am a frequent speaker on emerging technology markets and related financial measures. I have addressed mass media audiences including Bloomberg Morning Call, Bloomberg Evening Market Pulse, Bloomberg Final Word, CNBC Closing Bell, CNBC On the Money, CNBC Street Signs, CBS News Radio, and Fox Business National Television. I have also appeared as a judge on PBS's *Everyday Edisons*.

8.   On more than forty occasions, I have served as an expert in federal court or the International Trade Commission on questions relating to intellectual property economics, including the subjects of business valuation, licensing, the calculation of economic damages, the determination of profit disgorgement, the evaluation of commercial success, and the equities of a potential injunction. As an inventor, I have more than twenty issued U.S. patents. I am a frequent instructor for graduate studies on IP management and markets and a Summa Cum Laude graduate of the University of Notre Dame majoring in accountancy and philosophy. I am Certified in Financial Forensics, a Certified Licensing Professional and a Registered Certified Public Accountant in the State of Illinois. A detailed version of my curriculum vitae is attached as **Exhibit 1**.

9.   Ocean Tomo is presently being compensated for my work in this matter at my current billing rate of $795 per hour. Other Ocean Tomo consultants are assisting me in this engagement and are being compensated at rates less than $795 per hour. No part of my compensation depends on the outcome of this dispute.

2.   ASSIGNMENT

10.   Ocean Tomo was retained by Orrick, Herrington & Sutcliffe LLP ("Orrick") counsel for plaintiff, Oracle America, Inc. ("Oracle" or "Plaintiff"), in connection with this matter in July of 2015. Ocean Tomo has been asked to evaluate the amount of monetary recovery due to Oracle for Google Inc.'s ("Google" or "Defendant") infringement of copyrights in the Java platform ("the Infringed Java Copyrights") in connection with Google's Android platform for use in mobile phones and other devices.

11.   In order to accurately evaluate the measure and amount of monetary recovery due Oracle, Ocean Tomo has relied upon the following types of documents:

- Legal filings;
- Documents produced by Oracle;
- Documents produced by Google;
- Publicly available information relating to the relevant parties, market, products and platforms;
- Prior sworn testimony of various Oracle witnesses including:

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- Mr. Georges Saab, Vice President, Software Development, Java Platform Group, December 16, 2015[1]

- Mr. Terrence Barr, Senior Technologist and Principal Product Manager, Internet of Things Cloud Service, December 9, 2015[2]

- Mr. Alan Brenner, Senior Vice President Client Systems Group (former Sun employee), December 15, 2015[3]

- Mr. David Hofert, Senior Director, Java Business Development, December 1, 2015[4]

- Mr. Michael Ringhofer, Vice President, Worldwide Java Business, December 2, 2015[5]

- Mr. Mark Wayne, Managing Counsel of Licensing, December 3, 2015[6]

- Mr. Donald Smith, Senior Director of Product Management, November 20, 2015[7]

- Mr. Edward Senteno, Java Finance Controller, November 18, 2015[8]

- Mr. Vineet Gupta, Vice President, Chief Technology Officer and Chief Software Officer and Business Development General Manager (former employee), July 26, 2011[9]

- Mr. Jeet Kaul, Vice President Java Development Group (former employee), August 5, 2011[10]

- Mr. Lawrence Ellison, CEO, August 12, 2011[11]

- Mr. Craig Gering, Vice President Java Development (former employee), July 20, 2011[12]

- Dr. Mark Reinhold, Chief Architect of the Java Platform, August 5, 2011 and February 15, 2012[13]

- Mr. Jonathan Schwartz, former CEO of Sun, July 20, 2011[14]

■ Prior sworn testimony of various Google witnesses including:

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[1] Deposition of Georges Saab, December 16, 2015, p. 35.

[2] Deposition of Terrence Barr, December 15, 2015, 15.

[3] Deposition of Alan Brenner, December 15, 2015, pp. 61 and 63.

[4] Deposition of David Hofert, December 1, 2015, p. 10.

[5] Deposition of Michael Ringhofer, December 2, 2015, p. 12.

[6] Deposition of Mark Wayne, December 3, 2015, p. 36.

[7] Deposition of Donald Smith, November 20, 2015, p. 24.

[8] Deposition of Edward Senteno, November 18, 2015, p. 10.

[9] Deposition of Vineet Gupta, July 26, 2011, p. 25.

[10] Deposition of Jeet Kaul, August 5, 2011, Exhibit 381.

[11] Larry Ellison Biography, https://www.oracle.com/corporate/executives/ellison/index.html

[12] Deposition of Craig Gering, July 20, 2011, p. 231.

[13] Deposition of Dr. Mark Reinhold, February 15, 2012, p. 6.

[14] Deposition of Jonathan Schwartz, July 20, 2011, p. 9.

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- – Mr. Urs Hoelzle, Sr. Vice President of Engineering, November 24, 2015[15]

- – Mr. William Rutledge, Director of Developer Relations, December 9, 2015[16]

- – Mr. Reto Meier, Developer Advocate, December 11, 2015[17]

- – Mr. Jonathan Gold, Finance Director, December 11, 2015[18]

- – Mr. Anwar Ghuloum, Engineering Director for Android, December 9, 2015[19]

- – Mr. Hiroshi Lockheimer, Senior Vice President, December 8, 2015[20]

- – Mr. Aditya Agarwal, Senior Financial Analyst for Android, April 8, 2011,[21] and May 10, 2012[22]

- – Mr. Andrew Rubin, Senior Vice President of Mobile, April 5, July 27, and August 18, 2011[23] and April 27, 2012[24]

- – Mr. Larry Page, CEO of Google, August 24, 2011[25]

- – Mr. Eric Schmidt, Chairman of Google's Executive Board, August 23, 2011[26]

- – Ms. Susan Wojcicki, Senior Vice President of Advertising at Google, August 31, 2011[27]

- Deposition testimony of third party witnesses including:

  - – John Duimovich, IBM Distinguished Engineer, December 21, 2015[28]

- Discussions with Oracle Employees including:

  - – Mr. Michael Pfefferlen, Finance Director, Worldwide Software Sales

  - – Dr. Mark Reinhold, Chief Architect, Java Platform Group

  - – Mr. Michael Ringhofer, Vice President, Worldwide Java Business

  - – Mr. Leo Cizek, Account Manager, Java Technology Licensing Group

  - – Mr. Edward Senteno, Java Finance Controller

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[15] Deposition of Urs Holzle, November 24, 2015, p. 34 and 316.

[16] Deposition of William Rutledge, December 9, 2015, p. 21.

[17] Deposition of Reto Meier, December 11, 2015, p. 21.

[18] Deposition of Jonathan Gold, December 11, 2015, p. 139.

[19] Deposition of Anwar Ghuloum, December 9, 2015, p. 198.

[20] Deposition of Hiroshi Lockheimer, December 8, 2015, p. 9.

[21] Deposition of Aditya Agarwal, April 8, 2011, p. 6.

[22] Deposition of Aditya Agarwal, May 10, 2012, p. 154.

[23] Deposition of Andrew Rubin, August 18, 2011, p. 155.

[24] Deposition of Andrew Rubin, April 27, 2012, p. 4.

[25] Deposition of Larry Page, August 24, 2011, p. 7.

[26] Deposition of Eric Schmidt, August 23, 2011, p. 7.

[27] Deposition of Susan Wojcicki, August 31, 2011, p. 5.

[28] Deposition of John Duimovich, December 21, 2015, pp. 15 – 16.

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- – Mr. Donald Smith, Senior Director, Product Management

- – Mr. Mark Wayne, Managing Counsel of Licensing

- ▪ Discussions with Oracle expert witnesses including:

- – Chris Kemerer, Ph.D.

- – Douglas C. Schmidt, Ph.D.

- – Robert Zeidman

- ▪ Prior orders and opinions in this case including:

- – Order Granting In Part Motion To Strike Damage Report Of Plaintiff Expert Iain Cockburn

- – Order Granting In Part And Denying In Part Google's Motion In Limine Number Three To Exclude Portions Of Dr. Cockburn's Revised Damages Report

- – Order Granting In Part And Denying In Part Google's Daubert Motion To Exclude Dr. Cockburn's Third Report

- – *Oracle America, Inc. v. Google Inc.,* 750 F.3d 1339 (Fed. Cir. 2014)

12.   A detailed listing of documents reviewed by Ocean Tomo in connection with this litigation to date is included in the footnotes to the report and/or the summary provided in **Exhibit 2**. **Exhibit 3** is a Timeline of Select Events relating to this matter. References to documents and testimony herein are meant to provide examples of supporting information, but are not intended to be a comprehensive or exhaustive listing of all known support or signify a heightened level of importance. In addition to this report, I may rely on video excerpts taken from videotaped depositions and/or demonstrative exhibits that illustrate the concepts and conclusions contained in this report. Such excerpts and/or demonstratives have not yet been prepared.

13.   The opinions discussed throughout this report are based on my current understanding of the facts and circumstances surrounding this matter, my review of the produced documentation, testimony, third party and public information available to date and any underlying assumptions upon which I have relied. As such, the analyses and opinions described herein are subject to change based upon additional discovery or any other relevant development. To that point, as of the date of this report, I understand discovery is ongoing and several expert reports have yet to be filed. More specifically, I anticipate receiving a report from Google's expert on damages that addresses issues relating to expense reduction and apportionment, among other things. As such, I anticipate filing a responsive report relating to those issues, consistent with the overall case schedule entered by the Court.

14.   In connection with my work in this matter, I have assumed the Infringed Java Copyrights are copyrightable and have been infringed. That assumption is made exclusively for the purpose of determining the appropriate measures and amounts of monetary recovery, and in no way represents any form of legal conclusion.

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3.   SUMMARY OF OPINIONS

15.   I understand Oracle is entitled to the amount of actual damages it has suffered as a result of Google's infringement, as well as any profits earned by Google which are attributable to its infringement, but not taken into account in computing Oracle's actual damages.[29] I understand that the Copyright Act sets forth a burden shifting approach to disgorgement of profits, whereby the plaintiff first bears the burden to identify the amount of gross revenue attributable to the infringement, and the defendant then bears the burden to establish both expense deductions and the apportionment of profits between infringing and non-infringing attributes of the accused product.

16.   In offering the disgorgement opinions set forth herein, I have gone beyond the burden ordinarily required of the plaintiff and offered not only gross revenues attributable to the infringement but also those expense deductions that in my opinion are appropriate, based on the record currently available to me. I have not addressed the apportionment of those profits between infringing and non-infringing attributes of the Android Platform, but expect to do so in a further report as set out by the three-part damages report schedule in this case. Accordingly, when I refer herein to the revenues or profits attributable to the infringement, I am referring to the unapportioned revenues and/or profits that in my opinion meet the causal nexus test as I understand it as further explained herein.

17.   At a minimum, Google's infringement of the Java Copyrights resulted in Oracle losing licensing revenues from third-party license agreements and also prevented Oracle (or its licensees) from launching a new mobile platform. I have quantified Oracle's lost profits from lost licensing revenues from third parties by comparing Sun's projected annual Java Platform, Micro Edition ("Java ME") licensing revenues to Oracle's actual annual Java ME licensing revenues. I then subtracted the costs and expenses Oracle would have incurred in order to generate the additional Java ME revenue. Oracle's lost profits from lost Java ME license agreements with third parties total $475 Million. As of the date of this report, I am unable to quantify with reasonable certainty Oracle's lost profits resulting from it having been prevented from launching a new mobile operating system, nor any other component of potential loss, although I am confident that such losses in fact occurred.

18.   In addition to Oracle's losses, I have also quantified the amount of profit Google realized as a result of the infringement of the Java Copyrights by the Android platform. In my opinion, some portion of those profits also reflects the uncalculated lost opportunity to Sun/Oracle to launch a new mobile platform. Google has generated Android-related revenue and profit which is attributable to the Infringed Java Copyrights, including: advertising revenues associated with Android devices; sales of Applications and Digital Content through Android Market/Google Play; and sales of Google's Nexus smartphones. As noted, although I understand Oracle is only required to present proof of the infringer's gross revenues, I have nonetheless included in my

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[29] 17 U.S.C. §504 – Remedies for Infringement: Damages and Profits.

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analysis all of the costs and expenses which I believe should be deducted from those gross revenues, based on the information currently known to me. Therefore, I have calculated the amount of profit Google earned that is attributable to infringement of the Java Copyrights over the period of 2008 to 2015 to be $21.27 Billion.

19. A summary of my opinions can be found in **Figure 1**.

Figure 1

Summary of Opinions

Measure of Monetary Recovery	Amount (in Billions)
Oracle's Actual Damages	$0.48
Google's Android-Related Profits	$21.27

20. Several key considerations underlying my opinions are as follows:[30]

- The growth of the worldwide market for wireless handheld devices from 2003 to 2015

- The increase in Internet searches conducted from mobile devices from 2003 to 2015

- The opportunity, presented by infringing the Java Copyrights, to tap into the Java developer community and to more quickly get the Android platform to market during a critical "mobile window."

- The opportunity, presented in part by infringing the Java Copyrights, to maintain and expand the Google brand by moving in a timely fashion into the market for mobile search

- The Android-related Ad Revenues and profits Google realized from 2008 to 2015, and expects to continue to realize in the future

- The revenues and profits Google earned and expects to continue to earn from sales of Apps and Digital Content through Android Market/Google Play

- The substantial Research & Development ("R&D") costs incurred by Sun and Oracle to develop and maintain the Java platform

21. The specific bases for my opinions are provided throughout the remainder of this report. As reflected in the sections that follow, my report begins with an overview of several entities which are relevant to the determination of damages. Next, I provide an overview of the litigation

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[30] I reserve the right to further refine my opinion upon further review of the records and consideration of the facts of this case.

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history to date and describe how Google's actual and expected business performance for Android has significantly evolved over time.

22.   The introductory sections lead into a detailed discussion of certain background facts, which provide the foundation necessary to determine and calculate lost profits and disgorgement in this matter. That background discussion begins with a description of the copyrighted works, including the Java platform and then moves to the evolution of the mobile industry and Google's corresponding mobile business strategy. Through that discussion, I establish that Google had a significant need, at a specific time, for a mobile platform which could be leveraged to capitalize on the seismic shift from desktop to mobile computing. In connection with that discussion, I describe the broad market reach Android has obtained, including the establishment of a vast developer community, as well as OEM and carrier involvement. I also discuss the importance of the Android platform to Google's mobile strategy and discuss the importance of the Infringed Java Copyrights to the Android platform.

23.   Finally, I address Oracle's actual damages by considering what Oracle would have earned "but-for" Google's infringement. On that point, I conclude that Oracle has lost profits on several fronts including, but not necessarily limited to, a reduction in Java ME licensing revenue and a failed effort to develop a mobile platform. In addition to Oracle's losses, I address the profits Google has made through its improper use of the Infringed Java Copyrights. In connection with performing that analysis, I have identified and quantified the Android related revenues which are attributable to the infringement of the Java Copyrights, as well as the costs and expenses that actually helped generate those revenues (although that burden typically falls to the Defendant). Finally, I provide an opinion regarding Oracle's statutory damages.

4.   THE RELEVANT ENTITIES

4.1   Sun Microsystems, Inc. ("Sun")

24.   Sun Microsystems Inc., was incorporated in February 1982 in California.[31] Sun completed an initial public offering in 1986. Until August 2007, Sun's equity securities were traded on the NASDAQ stock exchange under the ticker symbol "SUNW," which stood for Stanford University Network Workstation. Sun's ticker symbol was changed to "JAVA" in August 2007 to reflect the popularity of Sun's Java software platform.[32]

25.   On April 19, 2009, Sun entered into an agreement whereby Oracle Corporation would acquire all of Sun's common stock, and Sun would become a wholly owned subsidiary of Oracle ("the 2010

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[31] Sun was later reincorporated in Delaware. Sun 2009 Form 10-K, p. 3.

[32] Sun Microsystems to Change Ticker Symbol to JAVA, http://www.eweek.com/c/a/IT-Infrastructure/Sun-Microsystems-to-Change-Ticker-Symbol-to-JAVA.

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Sun/Oracle Merger").[33] The 2010 Sun/Oracle Merger closed in January 2010,[34] and Sun was renamed Oracle America, Inc.

26. Prior to the 2010 Sun/Oracle Merger, Sun was a leading developer of enterprise and network computing products and technologies, operating in the computer systems, storage, and services markets, including hardware and software products.[35] As of 2006, Sun described its business strategy as providing "superior offerings that rely on innovation as a core differentiator."[36] According to Sun, the Java software platform was one of its primary R&D investments:

> "In order to maintain our position as a leading developer of enterprise and network computing products and technologies, we must continue to invest and innovate. Over the past few years, in addition to significant investments in research and development, we have also made significant investments in several products and services technology acquisitions. Our investments in research and development and acquisitions include the following . . . .

> The cross-platform Java software development environment, spanning smart cards, cellular handsets, set top boxes, desktops, computers and servers, provides our customers and [independent software vendor] ISV partners with an end-to-end architecture that extends our common Java™ technology-based programming environment across many different platforms, making real the concept of 'Write Once, Run Anywhere.' Our products provide exceptional price-performance, flexibility, scalability and choice for devices as small as smart cards and cell phones up through large, multi-million dollar systems."[37]

27. Sun developed the Java platform for computer programming. It was released in 1996.[38] As of 1996, the Java platform had eight API Packages of pre-written programs.[39] According to Sun:

> "In fiscal 1996, the Company established a new operating division that is chartered to develop, market and support Java, a robust, object-oriented, secure programming language. The Java Application Environment ("JAE") is one of the first widely accepted application environments to enable the platform – independent development of application software. In fiscal 1996, Sun licensed JAE to over thirty computer and software companies, including several high volume operating system vendors. These vendors plan to integrate JAE into their operating systems so that applications written in Java will run on their systems."[40]

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[33] Sun 2009 Form 10-K, p. 3.

[34] http://www.oracle.com/us/corporate/press/044428.

[35] Sun 2009 Form 10-K, p. 8.

[36] Sun 2006 Form 10-K, p. 3.

[37] Sun 2006 Form 10-K, p. 4.

[38] *Oracle America, Inc. v. Google Inc.*, 750 F.3d 1339, 1348 (Fed. Cir. 2014).

[39] *Oracle America, Inc. v. Google Inc.*, 872 Fed. Supp. 2d 974, 982 (N.D. Cal. 2012).

[40] Sun 1996 Form 10-K, p. 4.

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28.   In connection with the release of Java, Sun established the Java Community Process ("JCP")
        Program. The JCP is the mechanism for developing standard technical specifications for Java
        technology.[41] Through the JCP Program, anyone can participate in reviewing and providing
        feedback for the Java Specification Requests ("JSR"), and anyone can sign up to become a JCP
        Member and then participate in the Expert Group of a JSR or even submit their own JSR
        Proposals.[42]

29.   In addition, Sun organized and sponsored annual JavaOne developer conferences which drew
        thousands of Java programmers. According to Sun, more than 6,000 attendees participated in
        the first JavaOne conference in 1996, and more than 10,000 developers attended the second
        JavaOne conference in 1997.[43] By 2005, the tenth anniversary of the release of Java, Sun
        estimated Java drove more than $100 billion of business annually. Sun counted more than 4.5
        million Java developers, 2.5 billion Java-enabled devices, and 1 billion Java technology-enabled
        smart cards. The Ovum market research firm estimated that more than 708 million Java-enabled
        handsets were in circulation by June 2005.

30.   Commenting on the development of the Java platform, Mr. Vineet Gupta, the former Oracle
        Vice President, CTO and CSO and Business Dev. GM, indicated that "hundreds of people [at
        Sun] have spent 15 years creating a technology with an ecosystem that was well-balanced."[44]
        Sun's substantial investment in the Java platform is reflected in Sun's annual R&D expenses.
        Exhibit 4 is a summary of Sun's R&D expenses for the fiscal years 1990 to 2009. As **Exhibit 4**
        illustrates, Sun incurred R&D expenses totaling more than $24.8 billion during that 20-year
        period 1990 to 2009 to develop Java and its other innovative products and services.

31.   Java was an important part of Sun's success. According to Sun, the success of its software
        business was attributable to the "ability to attract innovative application developers to [the] Java
        platform and Solaris Operating System."[45] According to Mr. Gupta, "I personally believe, and I
        think several people in Sun believed, that the last seven to ten years of Sun's survival was because
        of the Java platform, not because of the servers and infrastructure they built."[46]

4.2   Oracle America, Inc.

32.   Oracle America, Inc. is a wholly-owned subsidiary of Oracle Corporation.[47] Oracle Corporation
        was incorporated in Delaware in 2005. Oracle Corporation is the successor to a company
        founded in 1977 by Mr. Larry Ellison, Mr. Richard Miner, and Mr. Ed Oates named Software

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[41] The Java Community Process Program, https://www.jcp.org/en/home/index.
[42] The Java Community Process Program, https://www.jcp.org/en/home/index.
[43] Java Timeline – 1995 – 2015, pp. 19 – 20.
[44] Deposition of Vineet Gupta, July 26, 2011, p. 338.
[45] Sun 2009 Form 10-K, p. 3.
[46] Deposition of Vineet Gupta, July 26, 2011, p. 77.
[47] Both Oracle Corporation and Oracle America, Inc. are sometimes referred to herein as "Oracle."

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Development Laboratories.[48] The company changed its name to Relational Software, Inc., and then later again to Oracle Systems.[49] Oracle Corporation completed its initial public offering in 1986. Its common stock was traded on the NASDAQ Global Select Market from 1986 until July 15, 2013, when it began trading on the New York Stock Exchange.[50]

33.   In January 2010, Oracle Corporation completed the 2010 Sun/Oracle Merger and thereby acquired Sun's interest in the Java software platform in a transaction valued at approximately $7.4 billion.[51] Oracle's acquisition was completed after Sun rejected a $7.0 billion bid from IBM.[52] According to Oracle Corporation, ▇▇

As of 2015, Oracle still considered Java to be a "key advantage" for its business.[54]

34.   Oracle noted that the 2010 Sun/Oracle Merger allowed Oracle to expand and enhance its customer base and services offerings.[55] Following the 2010 Sun/Oracle Merger, Oracle organized into three business units – software and cloud, hardware systems, and services.[56] Oracle generates the majority of its revenues from its software and cloud business unit, which accounted for 77 percent of Oracle's total revenues during its 2015 fiscal year.[57] A summary of Oracle's annual consolidated operating results for its fiscal years ending May 31, 2010 to 2015 is reflected in **Exhibit 5**.

35.   Oracle currently offers solutions under "the Java technology platform, the Solaris Operating System, the MySQL database management system, Sun StorageTek storage solutions, and the UltraSPARC processor names. Its solutions are used by Internet search, social networking, entertainment, financial service, manufacturing, healthcare, and engineering companies."[58] Oracle has strategic partnerships and alliances with technology companies such as Advanced

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[48] Oracle Historical Timeline, http://www.oracle.com/us/corporate/profit/p27anniv-timeline-151918.pdf.

[49] Oracle Historical Timeline, http://www.oracle.com/us/corporate/profit/p27anniv-timeline-151918.pdf.

[50] Oracle Corporation 2014 Form 10-K, p. 32.

[51] *Oracle America, Inc. v. Google Inc.*, 872 F.Supp.2d 974, 975 (N.D. Cal. 2012); http://www.oracle.com/us/corporate/press/018363

[52] http://www.reuters.com/article/sunmicro-ibm-idUSN0639015120090406.

[53] ▇▇

[54] Oracle Corporation 2015 Form 10-K, p. 10.

[55] Oracle Corporation 2010 Form 10-K, p. 11.

[56] Oracle Corporation 2015 Form 10-K, p. 4.

[57] Oracle Corporation's Fiscal Year ends on May 31st of each year. Oracle Corporation 2015 Form 10-K, p. 4.

[58] Technology Hardware, Storage and Peripherals Company Overview of Oracle America, Inc., *Bloomberg*, http://www.bloomberg.com/research/stocks/private/snapshot.asp?privcapId=34903.

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Micro Devices, Inc., Fujitsu, Intel Corporation, and Hitachi Data Systems.[59] Oracle is based in Redwood City (now Redwood Shores), California.[60]

4.3   Google Inc.

36.   Google was incorporated in California in September 1998 and re-incorporated in Delaware in August 2003.[61] Google was founded by Mr. Larry Page and Mr. Sergey Brin. It is headquartered in Mountain View, California.[62]

37.   Google's revenue has historically been "generated primarily by delivering relevant, cost-effective online advertising. Advertisers use Google's performance-based AdWords program to promote their products and services with targeted advertising. In addition, the thousands of third-party web sites that comprise the Google Network use Google's performance-based AdSense program to deliver relevant ads that generate revenue and enhance the user experience."[63] Advertisers use Google's Display program to promote their brands, and, although Google has failed to pay Sun/Oracle for its use of the Infringed Java Copyrights, it has historically entered into agreements with its other business partners that call for it to make payments for Android related services.

38.   In 2005, Google acquired Android, Inc. as part of a plan to enter the wireless industry.[64] Android was formed in October 2003 by Mr. Andrew Rubin, Google's Senior Vice President of Mobile.[65] Google's strategy was to "acquire Android with an aggressive milestone earn-out component" due to the fact that "Android's technology could be used to embed Google into [the] fastest growing global consumer product."[66] In furtherance of this strategy, Google entered into agreements with:

- Android Inc. to obtain rights to Android Inc.'s development-stage mobile operating system, and

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[59] Technology Hardware, Storage and Peripherals Company Overview of Oracle America, Inc., *Bloomberg*, http://www.bloomberg.com/research/stocks/private/snapshot.asp?privcapId=34903.

[60] Technology Hardware, Storage and Peripherals Company Overview of Oracle America, Inc., *Bloomberg*, http://www.bloomberg.com/research/stocks/private/snapshot.asp?privcapId=34903.

[61] Google 2014 Form 10-K, p. 48.

[62] About Google, https://www.google.com/about/company/.

[63] Google 2005 Form 10-K, p. 1.

[64] *Oracle America, Inc. v. Google Inc.*, 872 F.Supp.2d 974, 978 (N.D. Cal. 2012).

[65] Did you know Samsung could buy Android first, but laughed it out of court?, February 16, 2014, http://www.phonearena.com/news/Did-you-know-Samsung-could-buy-Android-first-but-laughed-it-out-of-court_id52685.

[66] Android, EMG M&A Review, April 18, 2005, GOOGLE-58-00048925 – 931 at 926.

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- Original Equipment Manufacturers ("OEMs") such as Samsung, HTC and LG to provide incentives to manufacture and distribute mobile devices based on the Android platform.

- Wireless Carriers such as T-Mobile, Vodafone, NTT DoCoMo and Verizon to provide incentives to adopt the Android platform for devices compatible with their wireless networks.[67]

39.   According to Google's 2013 Form 10-K, today its business is "primarily focused around the following key areas: search and display advertising, the Android platform, consumer content through Google Play, enterprise, commerce and hardware products."[68] In 2014 alone, Google generated $66 billion in revenue, $40 billion in gross profit and operating income of $16.5 billion. On December 31, 2015, Google's market capitalization was $522 billion. A summary of Google's reported annual operating results for the years ending December 31, 2008 to 2014 is reflected in **Exhibit 6**.

40.   During Google's Q3 2010 Earnings Call, Mr. Jonathan Rosenberg, Senior Vice President, Products at Google, announced that "[m]obile is on an annualized run rate of over $1 billion. This means the people who are accessing [Google's] products and services through their mobile phones are adding $1 billion annually to [Google's] existing revenue streams. Clearly, this is the future of search in the Internet, more people in more countries coming online from these smartphones. [Google's] mobile search queries have grown five times over the past couple of years. And of course, a lot more of those queries are now coming from Android phones."[69]

41.   Most recently, during its Q3 2015 Earnings Call, Google announced "[t]he key highlight this quarter was the substantial growth of our mobile search revenue complemented by ongoing strong contributions from YouTube and our programmatic business… Year-on-year and quarter-on-quarter growth reflect substantial strength in mobile search due to ongoing improvement in ad formats and delivery to better address how consumers use their mobile devices."[70] Further, Google announced that mobile search had surpassed desktop search worldwide, and mobile app usage and web usage is "accelerating significantly."[71]

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[67] GOOGLE-12-00134317 (Google internal email forwarding 11/6/2007 WSJ discussing OHA announcement and Google deals with HTC, Samsung, Motorola, T-Mobile, Sprint, Nextel, NTT DoCoMo).

[68] Google 2013 Form 10-K, P. 3

[69] Google CEO Discusses Q3 2010 Results – Earnings Call Transcript, October 14, 2010, http://seekingalpha.com/article/230158-google-ceo-discusses-q3-2010-results-earnings-call-transcript.

[70] Alphabet (GOOG) Q3 2015 Results – Earnings Call Transcript, October 22, 2015, http://seekingalpha.com/article/3596706-alphabet-goog-q3-2015-results-earnings-call-transcript.

[71] Alphabet (GOOG) Q3 2015 Results – Earnings Call Transcript, October 22, 2015, http://seekingalpha.com/article/3596706-alphabet-goog-q3-2015-results-earnings-call-transcript.

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42.   A July 2015 Trefis analyst report estimated that "PC search ads and mobile search ads contribute approximately 67% to [Google's] value."[72] Trefis further reported that "[t]he mobile search ads division is the second largest division for Google and makes up approximately 34% of its total value, according to our model. Google, with 90% market share, dominates the mobile search engine market. One of the key reasons for this dominance is its flagship Android OS, which has witnessed excellent adoption and penetration in the smartphone space."[73]

5.   THE DISPUTE

5.1   Procedural Background[74]

43.   Shortly after the 2010 Sun/Oracle Merger, Oracle sued Google and accused the Android platform of infringing certain Java-related copyrights and patents.[75] The parties proceeded to trial in 2012.

44.   At the conclusion of the trial, the jury found no patent infringement,[76] but found that Google had infringed certain Java Copyrights. The jury deadlocked on the issue of fair use.[77]

45.   On May 31, 2012, the District Court issued its decision on copyrightability, finding that the replicated elements of the APIs in question – including the declaring code and the SSO – were not subject to copyright projection.[78] Accordingly, the District Court entered final judgment in favor of Google on Oracle's copyright infringement claims.[79] Both parties appealed.[80]

46.   On appeal, the Court of Appeals for the Federal Circuit ("the CAFC") concluded that "the declaring code and the structure, sequence, and organization of the API Packages are entitled to copyright protection," and reversed the opinion of the District Court "with instructions to reinstate the jury's infringement finding as to the 37 Java packages."[81] According to the CAFC, "[b]ecause the jury deadlocked on fair use, we remand for further consideration of Google's fair use defense . . . ."[82]

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[72] Google Earnings: Profits Soars as the Company Reins in Cost, *Trefis*, July 17, 2015, p. 1.

[73] Google Earnings: Profits Soars as the Company Reins in Cost, *Trefis*, July 17, 2015, p. 2.

[74] This section is offered to place in context my understanding of the prior proceedings in connection with explaining the findings of this report to the Rule 706 expert and the Court and in connection with any *Daubert* proceedings. I do not expect to testify in front of the jury about a prior trial or appeal.

[75] *Oracle America, Inc. v. Google Inc.*, 872 F.Supp.2d 974, 975 (N.D. Cal. 2012).

[76] *Oracle America, Inc. v. Google Inc.*, 750 F.3d 1339, 1347 (Fed. Cir. 2014).

[77] *Oracle America, Inc. v. Google Inc.*, 872 F.Supp.2d 974, 976 (N.D. Cal. 2012).

[78] *Oracle America, Inc. v. Google Inc.*, 750 F.3d 1339, 1348 (Fed. Cir. 2014).

[79] Except with respect to the rangeCheck code and the eight decompiled files.

[80] Google appealed the District Court's ruling with respect to the rangeCheck code and the eight decompiled files.

[81] *Oracle America, Inc. v. Google Inc.*, 750 F.3d 1339, 1348 (Fed. Cir. 2014).

[82] *Oracle America, Inc. v. Google Inc.*, 750 F.3d 1339, 1348 (Fed. Cir. 2014).

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47.   I understand the present proceedings are to determine infringement of the Java Copyrights by additional versions and extensions of the Android platform as alleged in the Supplemental Complaint, decide the issue of fair use, and to determine willfulness and the proper measure and amount of monetary recovery for the infringement of the Java Copyrights. On that point, according to the Expert Report of Robert Zeidman ("Zeidman Report"), since October 28, 2010, Google has continued to infringe Oracle's copyrights in the Java platform. Since then, Google has released the following seven infringing versions of the Android platform:

- Gingerbread (released December 2010)

- Honeycomb (released February 2011)

- Ice Cream Sandwich (released October 2011)

- Jelly Bean (released July 2012)

- KitKat (released October 2013)

- Lollipop (released November 2014)

- Marshmallow (released October 2015)[83]

48.   According to the Zeidman Report and the Expert Report of Chris Kemerer Ph.D. ("Kemerer Report"), these Android releases copy thousands of lines of source code from the Java platform, as well as the structure, sequence and organization ("SSO") of that platform as reflected in the 37 Java API Packages."[84] I understand that the scope of Android's utilization of the Java platform has regularly increased with the introduction of each new version of Android.[85] In the Supplemental Complaint, Oracle asserts, in part, that:

- Android will still not work without the Infringed Java Copyrights[86]

- Android has become the most widely used mobile platform in the world[87]

- There are over one billion active monthly Android users and more than 8,000 different devices running versions of Android[88]

- Users have downloaded more than 50 billion applications from Google Play[89]

5.2   The Evolution of Google's Android Business

49.   Any assessment of monetary recovery must consider Google's complete scope of use of the Infringed Java Copyrights. To that point, since the 2011/2012 time period, the use of the

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[83] Expert Report of Robert Zeidman, January 8, 2016, pp. 3 – 4.

[84] Expert Report of Robert Zeidman, January 8, 2016, pp. 10 – 11; Expert Report of Chris F. Kemerer, January 8, 2016, p. 6.

[85] Expert Report of Chris F. Kemerer, January 8, 2016, pp. 15 – 16

[86] Plaintiff Oracle's Supplemental Complaint, August 12, 2015, p. 1.

[87] Plaintiff Oracle's Supplemental Complaint, August 12, 2015, p. 2.

[88] Plaintiff Oracle's Supplemental Complaint, August 12, 2015, p. 3.

[89] Plaintiff Oracle's Supplemental Complaint, August 12, 2015, p. 3.

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Android platform has increased exponentially. For example, as of December 2011, 314.3 million Android devices had been sold worldwide. Since 2011, an additional 3.8 billion Android devices have been sold worldwide. **Figure 2** below illustrates the difference between Android worldwide unit sales during the four-year period 2008 to 2011, and Android worldwide unit sales during the four-year period 2012 to 2015.

Figure 2

Comparative Analysis of Android Unit Sales[90]

(in thousands)	2008	2009	2010	2011	Total
Android Phones	–	6,798	67,225	219,440	293,463
Android Tablets	–	–	2,786	18,030	20,816
Total Android Units	–	6,798	70,011	237,470	314,279

(in thousands)	2012	2013	2014	2015	Total
Android Phones	451,621	761,288	1,004,675	1,133,616	3,351,200
Android Tablets	53,341	120,961	154,700	139,800	468,803
Total Android Units	504,962	882,249	1,159,375	1,273,416	3,820,003

5▉. During the period of Android's launch through December 2011, Google had realized Android-related revenues of $881.2 million. According to Google's then-CEO Eric Schmidt (reporting to Google's Board of Directors), Android reached "escape velocity" only in the latter half of 2010[91], and my calculation of Android profits by the end of 2011 as expressed herein is negative. Therefore, the Android business the Court heard about during the first trial was a business just leaving its infancy.

51. Google, however, always had a much longer range plan for Android. As described in greater detail herein, Google did not expect that strategy to come to fruition until 2012.[92] Its expectations were more than met. Since 2011, Google has realized additional Android-related revenues of ▉▉▉▉▉▉. **Figure 3** below illustrates the difference between Google's Android-related revenues realized during the four-year period 2008 to 2011, and Google's Android-related revenues realized during the four-year period 2012 to 2015.

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[90] See Exhibit 9.
[91] GOOGLE-22-00481881-884 at 882.
[92] Trial Exhibit 1061-GOOGLE-21-00008116 – 139 at 131.

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Figure 3

Comparative Analysis of Android-Related Revenues[93]

(in millions)	2008	2009	2010	2011	Total
Ads	$0.7	$15.7	$120.1	$569.4	$705.9
App Sales	N/A	1.1	8.0	36.2	45.3
Digital Content	N/A	0.0	0.0	14.8	14.8
Hardware	N/A	0.0	115.2	0.0	115.2
Total	$0.7	$16.8	$243.3	$620.4	$881.2

(in millions)	2012	2013	2014	2015	Total
Ads	$2,152.4	▬	▬	▬	▬
App Sales	136.1	▬	▬	▬	▬
Digital Content	105.8	▬	▬	▬	▬
Hardware	303.5	▬	▬	▬	▬
Total	$2,697.8	▬	▬	▬	▬

6. THE JAVA PLATFORM

52.   Sun developed the Java programming platform and released it in the mid-1990s.[94] The Java platform is now deployed on a wide range of devices, including mobile devices, such as phones, tablets, e-readers and home appliances, automobiles and other products within the category of the Internet of Things ("IOT").[95] The principal objective of the Java platform when it was released was to relieve computer programmers from the burden of writing different versions of their computer programs for different operating systems or devices. At Sun, and now Oracle, Java enables a programmer to "Write Once, Run Anywhere."

53.   The ability to write a program that runs across multiple operating systems or devices dramatically simplifies the development process. A programmer need not start from scratch, or even make substantial modifications, to a program once written. So, for example, a Java program can run both on a Lenovo Thinkpad and a Macbook Air, even though they use entirely different operating systems. The Java platform also preserves compatibility for the benefit of developers and end-users, in addition to protecting Sun's and Oracle's commercial interests.

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[93] See Exhibit 8.

[94] http://www.oracle.com/technetwork/java/javase/overview/javahistory-index-198355.html

[95] Oracle's First Supplemental Responses and Objections to Google's Seventh Set of Interrogatories dated December 16, 2015, p. 3.

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6.1   Components of the Java Platform

54.   The Java platform contains three distinct pieces: the Java Language, the Java Virtual Machine ("JVM") and the Java APIs. The Java platform, including the Java APIs at issue in this matter, is used by developers and programmers to create and run many different programs and applications ("Apps").

6.1.1   Java Programming Language

55.   The Java programming language is a human-readable language that is used by developers and programmers to generate lines of computer code. Code written in a human-readable language — "source code" — is not readable by computer hardware. Only "object code," which is not human-readable, can be used by computers. Most object code is in binary language, meaning it consists entirely of 0s and 1s. Thus, a computer program written in a programming language ordinarily has to be converted, that is, compiled, from source code into object code before it can run, or "execute." Sometimes a computer program is converted to machine code during execution, instead of compiled beforehand, in a process referred to as "interpreting" the code.

56.   The Java programming language is object-oriented, it bundles procedures, behaviors and data into "objects" that can interact with one another through specific code sequences. Code sequences for Java are categorized as either "methods" or "classes." The Java programming language is used by developers and programmers to write methods and classes, and to create objects, which are then executed on computers and other technological devices.[96]

6.1.2   The Java Virtual Machine

57.   Programs written in the Java programming language are run in an execution environment called the "Java Virtual Machine." The Java Virtual Machine allows for portability of programs. Machine code compiled for one type of computer hardware cannot, generally, be run on a different type of hardware (such as MACs v. PCs). The Java Virtual Machine, however, allows a program written in the Java programming language to run on different types of computer hardware. This is because the Java platform uses an intermediate form of code—called bytecode—that is simpler than source code but not as simple as machine code. Source code for a particular program can be compiled into bytecode instead of machine code, and then the bytecode can be distributed to the Java Virtual Machine running on top of a wide variety of computer hardware. The Java Virtual Machine can then run the program, interpreting the bytecode into machine code compatible with the particular hardware architecture on which the virtual machine was implemented. Thus, a program written for the Java Virtual Machine can be run on any computer with a Java Virtual Machine, regardless of that computer's underlying hardware architecture.[97]

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[96] Expert Report of Prof. Douglas Schmidt, January 8, 2016, pp. 11 – 13.
[97] Expert Report of Prof. Douglas Schmidt, January 8, 2016, pp. 11 – 13.

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6.1.3   The Java APIs

58.   The Java API packages are a collection of prewritten programs, written in the Java programming
language, that contain classes and methods. I understand Douglas Schmidt explained "each Java
API package has groups of classes and methods that perform discrete operations. These Java
API packages provide valuable material that helps developers write applications more quickly. A
particularly important benefit of these Java API packages is allowing developers to avoid the
tedious and error-prone effort associated with writing their own classes and methods for certain
behaviors."

6.2   The Popularity and Success of Java

59.   The Java software platform is currently a key factor to Oracle's continued success. According to
Oracle, Java is the "computer industry's most widely-used software development language."[98]
Millions of developers use Java to develop business applications, making it one of the most
powerful and popular development environments in the world.[99] According to Oracle, Java is
the basis upon which certain Oracle products and applications are built, including Oracle's
Fusion Middleware.[100]

60.   The popularity and success of Java is driven by many different factors including, but not
necessarily limited to the following.

- One of the key benefits of Java is the ability to "Write Once, Run Anywhere."[101]

- The extensive Java class libraries (Java API packages in compiled form) help
programmers to more easily create high quality programs."[102] "Generally, a software
library provides a set of functions, classes, or other program entities that are designed to
be used in a variety of programs. Once they are designed, built, and debugged, libraries
make it easier to build new programs because the components provided by a library can
be used directly without further programming effort. A programmer can invoke standard
libraries using the APIs that specify those libraries. The APIs express the organizational
scheme of the pre-written packages of code, and provide easily memorized shortcuts that
accelerate the programming process."[103]

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[98] Oracle Corporation 2015 Form 10-K, p. 10.

[99] Oracle Corporation 2015 Form 10-K, p. 10.

[100] Oracle Corporation 2015 Form 10-K, p. 10.

[101] How Will Java Technology Change My Life?,
//docs.oracle.com/javase/tutorial/getStarted/intro/changemylife.html.

[102] Expert Report of Chris F. Kemerer, January 8, 2016, p. 9.

[103] Trial Testimony of Joshua Bloch, Transcript Vol. 04, April 19, 2012, pp. 62-621; 633–635, 741, 744-746.

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- I understand that developers and companies prefer to work with APIs with which they are familiar in order to save time and maintain efficiency.[104] Therefore, Sun's efforts to encourage developers to learn and use Java, coupled with its inherent appeal, created a large base of programmers who learned the Java language and APIs. Once programmers acquired familiarity with the API because it was easy to use, the investment paid off in the form of improved efficiency in developing new programs. In addition, the "write once run anywhere" character of the Java platform allowed them to avoid re-writing each program multiple times for multiple platforms.[105]

- Java "has become one of the world's most popular programming languages and platforms."[106] Many software developers use the Java programming language, as well as Java's API Packages, to write applications or "Apps" for desktop and laptop computers, tablets, smartphones, and other devices.[107]

- Java is actively taught in universities as part of a Computer Science curriculum and is understood by programmers worldwide. Below is a graph from TIOBE, a software research firm founded in October 2000.[108] The TIOBE index is an indicator of the popularity of programming languages based on the number of skilled engineers worldwide, courses and third party vendors.[109] According to the TIOBE Index, Java has ranked first or second in the index since at least 2001, ranked in the top three since at least 2000, and won the Language of the Year award in 2005.[110]

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[104] Expert Report of Chris F. Kemerer, January 8, 2016, p. 24.

[105] Reinhold Trial Transcript at p. 718-719.

[106] *Oracle America, Inc. v. Google Inc.*, 872 F.Supp.2d 974, 977 (N.D.Cal. 2012).

[107] *Oracle America, Inc. v. Google Inc.*, 750 F.3d 1339, 1347 (Fed. Cir. 2014).

[108] http://www.tiobe.com/index.php/content/company/GeneralInfo.html

[109] http://www.tiobe.com/index.php/content/paperinfo/tpci/index.html; popular search engines such as Google, Bing, Yahoo!, Wikipedia, Amazon, YouTube and Baidu are used to calculate the ratings. The TIOBE Index is not about the *best* programming language or the language in which *most lines of code* have been written.

[110] TIOBE Index for September 2015, http://www.tiobe.com/index.php/content/paperinfo/tpci/index.html; The Java Programming Language, https://web.archive.org/web/20110723154236/http://www.tiobe.com/content/paperinfo/tpci/Java.html.

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Figure 4
TIOBE Index - 2002 to 2015[111]
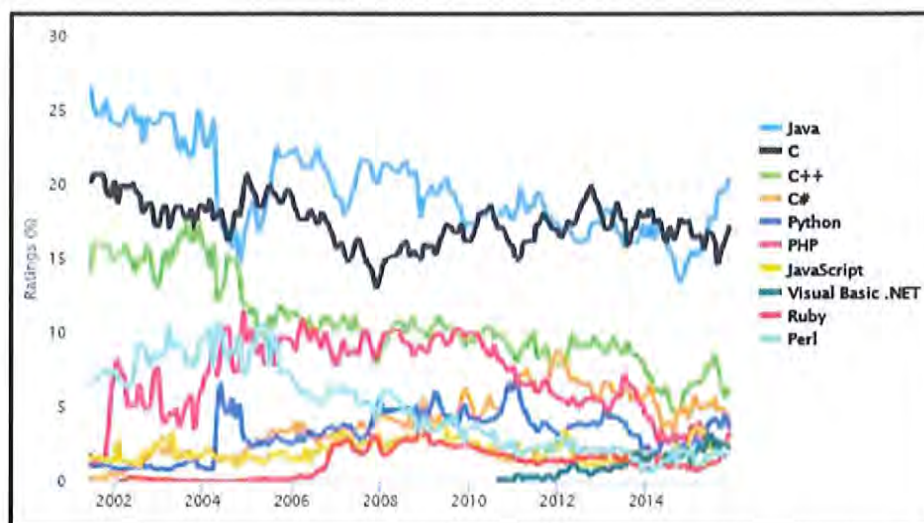
- In a 2006 Google presentation concerning Android, Google estimated there were 6 million Java developers worldwide and, because of this, Google's strategy should be to "[l]everage Java for its existing base of developers."[112] In June 2007, Sun confirmed Google's estimation when it reported there were 6 million Java developers worldwide.[113] Alan Brenner, former Senior Vice President of the Client Systems Group at Sun, testified in his deposition that, in 2006, Java "had at that point the largest mobile developer community in the market by several – by a couple orders of magnitude."[114]

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[111] http://www.tiobe.com/index.php/content/paperinfo/tpci /index.html
[112] Android Open Handset Platform, GOOGLE-01-00025576 – 587 at 584.
[113] JavaFX Mobile, June 2007, OAGOOGLE0004950038 – 063 at 041.
[114] Deposition of Alan Brenner, December 15, 2015, p. 75

Figure 5

Java Technology Momentum – Java Use in 2007[115]

- By January 2010, Oracle indicated that "Java Is Everywhere" with six billion Java-enabled devices, 1.9 billion Java-enabled phones, 180 operators deploying Java content, and six million developers.[116] As illustrated in **Figure 6** below, Oracle recently reported that there are 9 million Java developers worldwide.[117]

Figure 6

Java is Currently Everywhere – Current Java Use[118]

7.   THE EVOLUTION OF THE MOBILE INDUSTRY

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[115] JavaFX Mobile, June 2007, OAGOOGLE0004950038 – 063 at 041.

[116] The Java Platform: The Good, the Bad and the Ugly, January 2010, OAGOOGLE0000144253 – 330 at 256.

[117] Learn about Java Technology, https://java.com/en/about/.

[118] Learn about Java Technology, https://java.com/en/about/.

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7.1   The Growth of Wireless Connectivity

61.   The evolution of the mobile industry helps to explain Google's expanded scope of use and the increasing importance of the Infringed Java Copyrights to Google's business. The rapid expansion of the mobile industry also intensified the importance to Google of establishing a mobile presence, particularly in the wake of Apple's entry with the iPhone.

62.   Since 1983, the wireless industry has offered U.S. consumers an array of choices among service providers, service options, technology, and equipment.[119] According to a Federal Communication Commission ("FCC") December 18, 2014 report,[120] 96.8 percent of the U.S. population lives in census blocks served by three or more mobile service operators (or "carriers"),[121] and U.S. mobile wireless broadband provider availability was calculated at 93.4 percent having a choice of three or more providers.[122]

63.   The Cellular Telephone Industries Association ("CTIA") issues annual reports[123] that provide a comprehensive review of the results of CTIA's survey of U.S. wireless service providers.[124] The CTIA survey has been conducted since January 1985, originally as a cellular-only survey, and then as an all-wireless instrument.[125] CTIA surveys have been used to develop benchmarking information for wireless providers, and to document and demonstrate the nature of industry growth overall to policymakers.[126]

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[119] CTIA's Wireless Industry Indices – Annual Wireless Survey Results: A Comprehensive Report from CTIA Analyzing the U.S. Wireless Industry – Year-End 2014 Results, CTIA-The Wireless Association, Sept. 2015, p. 5.
[120] Entitled "Annual Report and Analysis of Competitive Market Conditions with Respect to Mobile Wireless, Including Commercial Mobile Services."
[121] FCC 14-1862, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Seventeenth Report, December 18, 2014, p. 24.
[122] FCC 14-1862, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Seventeenth Report, December 18, 2014, p. 26.
[123] Entitled "CTIA's Wireless Industry Indices – Annual Wireless Survey Results: A Comprehensive Report from CTIA Analyzing the U.S. Wireless Industry."
[124] CTIA's Wireless Industry Indices – Annual Wireless Survey Results: A Comprehensive Report from CTIA Analyzing the U.S. Wireless Industry – Year-End 2014 Results, CTIA-The Wireless Association, Sept. 2015, p. 1.
[125] CTIA's Wireless Industry Indices – Annual Wireless Survey Results: A Comprehensive Report from CTIA Analyzing the U.S. Wireless Industry – Year-End 2014 Results, CTIA-The Wireless Association, Sept. 2015, p. 11. According to the CTIA, the survey now includes the licensees holding spectrum also known as cellular, Enhanced Specialized Mobile Radio (ESMR), Personal Communications Services (PCS), Advanced Wireless Services (AWS), 700 MHz, and Broadband Radio Services.   AWS is a collective term used for new and innovative fixed and mobile terrestrial wireless applications using bandwidth that is sufficient for the provision of a variety of applications, including those using voice and data (such as Internet browsing, message services, and full-motion video) content (see, FCC 05-173, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Tenth Report, September 30, 2005, p. 34).
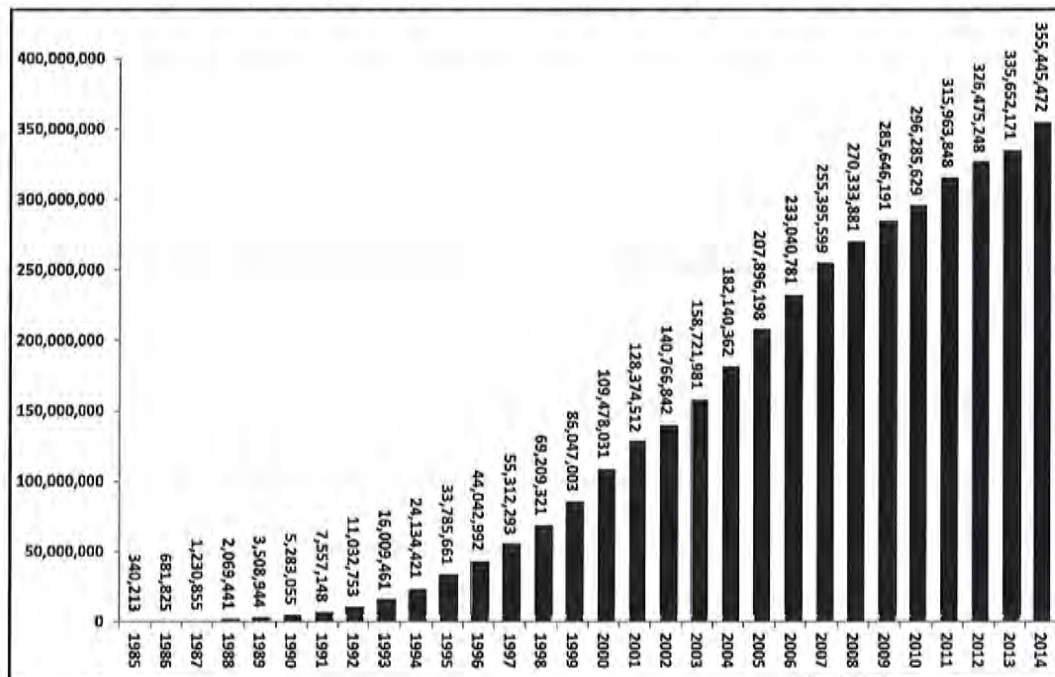[126] CTIA's Wireless Industry Indices – Annual Wireless Survey Results: A Comprehensive Report from CTIA Analyzing the U.S. Wireless Industry – Year-End 2014 Results, CTIA-The Wireless Association, Sept. 2015, p. 11.

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64.   **Figure 7** was published by CTIA, and reflects estimated year-end total wireless connections in the U.S. for the years 1984 to 2014. As **Figure 7** illustrates, estimated total wireless connections within the U.S. increased from 340,213 in 1985 to 355.4 million by December 2014.[127] As **Figure 7** illustrates, as of December 31, 2004, there were an estimated 182.1 million U.S. wireless connections, and as of December 31, 2008, there were an estimated 270.3 million U.S. wireless connections.

Figure 7

Estimated Wireless Subscriber Connections: January 1985 to December 2014

Year	Connections
1985	340,213
1986	681,825
1987	1,230,855
1988	2,069,441
1989	3,508,944
1990	5,283,055
1991	7,557,148
1992	11,032,753
1993	16,009,461
1994	24,134,421
1995	33,785,661
1996	44,042,992
1997	55,312,293
1998	69,209,321
1999	86,047,003
2000	109,478,031
2001	128,374,512
2002	140,766,842
2003	158,721,981
2004	182,140,362
2005	207,896,198
2006	233,040,781
2007	255,395,599
2008	270,333,881
2009	285,646,191
2010	296,285,629
2011	315,963,848
2012	326,475,248
2013	335,652,171
2014	355,445,472

65.   Further evidence of the growth in wireless connectivity is the fact that, during the year 2012, estimated U.S. wireless connections surpassed the U.S. population. **Figure 8** below illustrates year-end penetration figures applied to the U.S. population[128] based on statistics from the U.S. Census. As **Figure 8** illustrates, at an estimated subscribership of 355.4 million, the 2014 penetration rate was equal to 110 percent of all Americans. Such penetration rates represent significant growth over previous rates of 61 percent as of December 2004, and 87.2 percent as of December 2008.

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[127] CTIA's Wireless Industry Indices – Annual Wireless Survey Results: A Comprehensive Report from CTIA Analyzing the U.S. Wireless Industry – Year-End 2014 Results, CTIA-The Wireless Association, Sept. 2015, p. 24 - 25. The CTIA uses the terms "subscriber", "subscriptions", and "connections" interchangeably. *Id.* at p. 12.

[128] Inclusive of the territorial possessions of the United States.

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Figure 8

U.S. Wireless Penetration Rate as Percentage of U.S. Population[129]

Table 8: Wireless Penetration Rate as Percentage of U.S. Population			
Year-End	U.S. Population Year-End	Total Wireless Population	Total Wireless Penetration
1991	259,109,574	7,557,148	2.9%
1992	262,525,465	11,032,753	4.2%
1993	265,833,501	16,009,461	6.0%
1994	269,022,837	24,134,421	9.0%
1995	272,181,546	33,785,661	12.4%
1996	275,402,178	44,042,992	16.0%
1997	278,659,738	55,312,293	19.8%
1998	281,877,901	69,209,321	24.6%
1999	285,013,107	86,047,003	30.2%
2000	287,897,516	109,478,031	38.0%
2001	290,691,697	128,374,512	44.2%
2002	293,339,549	140,766,842	48.0%
2003	295,984,212	158,721,981	53.6%
2004	298,715,303	182,140,362	61.0%
2005	301,499,873	207,896,198	69.0%
2006	304,425,857	233,040,781	76.6%
2007	307,330,930	255,395,599	83.1%
2008	310,056,458	270,333,881	87.2%
2009	312,997,023	290,941,191*	92.9%*
2010	314,549,119*	296,285,629*	94.2%*
2011	316,790,638*	315,963,848*	99.7%*
2012	319,311,850*	326,475,248	102.2%
2013	321,669,712	335,652,171	104.3%
2014	324,094,196	355,445,472	109.7%

66.   Historically, U.S. wireless penetration rates have been lower than those of other countries. **Figure 9** below reflects wireless subscribership penetration rates for several countries within North America, Europe, and Asia for certain dates during the period Q4 2002 – Q4 2011.

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[129] CTIA's Wireless Industry Indices – Annual Wireless Survey Results: A Comprehensive Report from CTIA Analyzing the U.S. Wireless Industry – Year-End 2014 Results, CTIA-The Wireless Association, Sept. 2015, p. 31.

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Figure 9

Wireless Penetration Rates for Selected Countries[130]

	Q4 2002	Q4 2003	Q4 2004	Q4 2005	Q4 2006	Q4 2007	Q4 2008	Q4 2009	Q4 2011
USA	49	54	61	70	77	84	89	93	106
Canada	37	41	47	53	58	61	65	68	77
Hong Kong	-	95	106	106	108	138	148	-	-
Singapore	-	82	90	98	106	125	136	144	148
United Kingdom	85	91	104	113	117	122	126	129	123
Germany	72	79	87	97	104	118	131	132	139
Italy	93	99	110	123	138	153	153	147	152
Sweden	-	-	-	114	116	115	124	131	146
France	63	68	74	79	79	89	92	96	99
Spain	-	94	99	108	-	-	-	-	-
Finland	85	92	95	101	114	122	128	144	171
Japan	62	67	71	74	78	82	86	88	99
South Korea	68	70	76	79	83	90	94	99	107
Australia	68	78	89	95	98	104	110	115	132

As **Figure 9** illustrates, as of Q4 2004, the U.S. wireless penetration rate of 61 percent was well below that of Hong Kong (106 percent), The United Kingdom (104 percent), Italy (110 percent), Spain (99 percent), and Finland (95 percent). As of Q4 2007, when the U.S. penetration rate was 84 percent, eight of the fourteen countries listed in **Figure 9** had penetration rates of more than 100 percent.

7.2   The Growth of Mobile Data Usage and Applications

### 7.2.1   The Growth of Internet Usage in the U.S.

67.   **Figure 10** below is a chart prepared by the Pew Research Center ("Pew") that illustrates the annual percentages of adults in the U.S. who used the Internet during the years 1996 to 2014. According to Pew's January 2014 survey, 87 percent of American adults used the Internet as of that time, up from 14 percent in 1995.[131]

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[130] FCC 03-150 to FCC 13-34, Annual Reports and Analyses of Competitive Market Conditions with Respect to Commercial Mobile Services. The reported U.S. penetration rate for Q4 2011 of 106 percent is higher than that reported by the CTIA.

[131] http://www.pewinternet.org/data-trend/internet-use/internet-use-over-time/

Figure 10

Increase in Internet Use within the U.S.
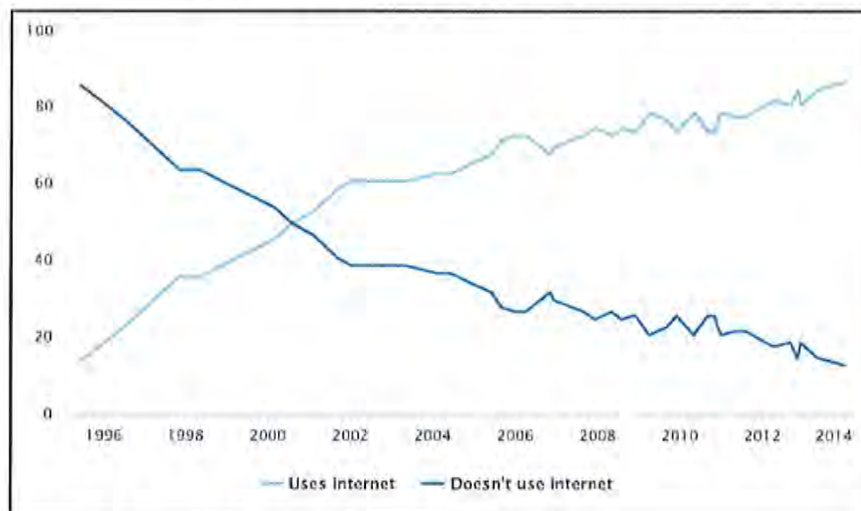
7.2.2   **The Growth of Mobile Data Usage and Applications**

68.   Mobile devices are generally classified by their applications and features. Since at least 2002, mobile device applications and features have included paging, text messaging, information alerts, ring tones, games, exchanging digital photos, web browsing, e-mail, and access to files stored on corporate servers, among others.[132] According to the FCC, as of early 2003, mobile devices offered for sale within the U.S. were generally grouped into one of the five product categorizes reflected in **Figure 11** below.[133]

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[132] FCC 03-150, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Eighth Report, July 14, 2003, p. 61.

[133] FCC 03-150, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Eighth Report, July 14, 2003, p. E-5.

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Figure 11

Classifications of Mobile Devices as of Early 2003[134]

Application/ Feature	Type of Device				
	Pager	Mobile Phone	Smartphone	PDA	Laptop
Voice		✓	✓		
Paging	✓	✓	✓		
Text Messaging	✓	✓	✓	✓	
Information Alerts	✓	✓	✓		
Ring tones & Graphics		✓	✓		
Games		✓	✓		
Images & Video		✓	✓	✓	✓
Web Browsing – Limited		✓	✓		
Web Browsing - Complete			✓	✓	✓
E-mail – POP3		✓	✓	✓	✓
E-mail – corporate			✓	✓	✓
Corporate server access			✓	✓	✓
QWERTY Keypad			✓	✓	✓
Color		✓	✓	✓	✓

69. As **Figure 11** illustrates, as of early 2003, Internet browsing via mobile phones was generally limited to the web sites offered by content providers with which carriers had agreements.[135] As of early 2003, most carriers allowed wireless web users to access a variety of popular web sites and applications on their mobile devices, but did not provide access to the entire Internet.[136] According to the FCC, "[w]hile the specific sites available to users vary by carrier, most carriers offer at least one version of the following: news and traffic updates; weather reports; sports scores; stock quotes and financial data; movie, flight and restaurant information; and horoscopes. Other applications available to wireless web users include shopping on websites such as Amazon.com, search engines and portals, and downloadable recipes."[137]

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[134] FCC 03-150, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Eighth Report, July 14, 2003, p. E-5.

[135] FCC 03-150, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Eighth Report, July 14, 2003, p. 71.

[136] FCC 03-150, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Eighth Report, July 14, 2003, p. 71.

[137] FCC 03-150, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Eighth Report, July 14, 2003, p. 71.

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70.   As **Figure 11** illustrates, as of early 2003, smartphones, personal digital assistants ("PDAs") and laptop computers offered complete web-browsing.[138] According to the FCC, at that time,

> *[W]ireless web services enable users to pull web-based information and applications from the Internet to their mobile devices. Subscribers who connect to the Internet via a wireless modem card attached to a laptop can surf the entire web using common PC browsers, such as Internet Explorer or Netscape. Users connecting via PDAs or some smartphone models were typically able to access most web sites, although some web pages may have been difficult to view given the smaller screen size and other constraints of such devices.[139]*

71.   An estimated 35 percent of all mobile phones in use as of February 2003 were capable of web browsing, up from 21 percent in November 2002.[140] In March 2003, market analysts estimated that 11.9 million, or 8.4 percent of the 141.8 million U.S. mobile telephone subscribers (as of the end of 2002) subscribed to some type of mobile Internet service.[141] According to the FCC, at the end of 2002 in the U.S., "[a]n additional 2.3 million consumers subscribed to mobile Internet services on data-only mobile devices."[142] One analyst estimated that, as of February 2003, 21 percent of web-enabled mobile phone users in the U.S., or 7.5 percent of all mobile telephone subscribers, were using their phones to browse the Internet.[143]

72.   By 2003, handset-based mobile data applications were gaining popularity in the U.S. For example, the volume of Short Message Service ("SMS") traffic continued to increase at a rapid pace. CTIA estimated that SMS traffic volume rose to more than 2 billion messages per month in December 2003.[144] By 2003, "[t]he popularity of mobile gaming also appears to have

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[138] FCC 03-150, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Eighth Report, July 14, 2003, p. E-5.

[139] FCC 03-150, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Eighth Report, July 14, 2003, p. 71.

[140] FCC 03-150, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Eighth Report, July 14, 2003, pp. 78 – 79 (citing to: *Eighteen Percent of U.S. Users Can't Live Without Their Wireless Phones*, CTIA Daily News, February 24, 2003 (citing Upoc and Frank N. Magid and Associates)).

[141] FCC 03-150, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Eighth Report, July 14, 2003, p. 11, (citing to: Luiz Carvalho et al., *A Look at Wireless Data: Don't Short SMS*, Morgan Stanley, Equity Research – Wireless Telcom Services, Mar. 2, 2003, at 3 ("Morgan Stanley Wireless Data Report")).

[142] FCC 03-150, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Eighth Report, July 14, 2003, p. 11.

[143] FCC 03-150, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Eighth Report, July 14, 2003, p. 71, (citing to: Tobi Elkin, *18% Would Rather Give Up TVs Than Wireless Phones*, AdAge, Feb. 24, 2003 (citing Upoc and Frank N. Magid and Associates)).

[144] FCC 04-216, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Ninth Report, September 28, 2004, p. 76.

increased in the past year. One analyst estimates that some 12.2 million Americans downloaded or subscribed to wireless games through their cell phone in 2003."[145]

73.   According to the FCC, "mobile telephone providers continued to build out their networks and expand service availability during 2005. Carriers also continued to deploy networks based on CDMA2000 1xEV-DO or WCDMA/HSDPA technologies that allow them to offer mobile Internet access services for mobile telephone handsets, PDAs, and laptops at speeds comparable to what many users get from fixed broadband connections such as DSL."[146]

74.   For example, in early 2005, Verizon Wireless introduced 3G handsets that could access Verizon's EV-DO network and launched VCAST, the first wireless multimedia service in the U.S. to be provided over the next-generation network using EV-DO technology. According to the FCC:

> VCAST customers can use the new 3G handsets to access the EV-DO networks for a wide range of content, including news programming and short, made-for-mobile episodes of TV programs. For a fixed monthly fee on top of what they pay for their regular Verizon calling plan, VCAST customers get unlimited access to Verizon's basic video news clips services and unlimited browsing of Verizon's "Mobile Web" news and information services. Premium content is also available for an additional cost, including 3-D games, music videos, and other premium channels.[147]

75.   The buildout of carriers' networks and the introduction of new technologies contributed to the growth of data subscribers in 2005. According to the FCC:

■   Based on figures reported by some of the nationwide carriers, it appears that the percentage of mobile telephone subscribers who use mobile data services has increased significantly in the past year. . . . Cingular and Verizon have reported that about a third of their customers are mobile data users, while the number of data subscribers reported by Sprint in the fourth quarter of 2004 indicates that slightly more than 40 percent of its customers are mobile data users.[148]

■   The results of an online market research survey designed to assess current usage of mobile data services are largely consistent with the picture emerging from the aggregate data on mobile data usage cited above. Online interviews were conducted

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[145] FCC 04-216, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Ninth Report, September 28, 2004, p. 76 (citing Roland Jones, Cell Phone Gaming Gathers Momentum, MSNBC, August 17, 2004 (citing Schelley Olhava, a wireless gaming analyst at market research firm IDC.))

[146] FCC 06-142, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Eleventh Report, September 29, 2006, p. 93.

[147] FCC 05-173, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Tenth Report, September 30, 2005, pp. 53-54.

[148] FCC 05-173, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Tenth Report, September 30, 2005, p. 62.

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with 1000 young consumers ranging in age from 13 to 34 in March 2005. Respondents were asked to estimate how often they used certain wireless phone features or applications in the past month.[149] 19 percent of respondents indicated that web browsing was a function that they performed on their phones.[150]

76.   With the launch of wireless broadband services based on EV-DO or WCDMA/HSDPA technologies by most nationwide providers and some smaller regional providers, the number of subscribers using mobile data services at broadband-like speeds grew significantly during this time period. The FCC estimated that high-speed Internet-access connections using mobile wireless technology increased by more than 18 million in 2006, from 3.1 million connections as of December 31, 2005 to 21.9 million connections as of December 31, 2006.[151] As described below, this increase coincided with enormous pressure within Google to complete development of Android.

77.   Based on consumer billing records, Telephia[152] estimates that mobile data usage reached approximately 50 percent of U.S. mobile subscribers in the fourth quarter of 2005, up from 43 percent in the first quarter of 2005.[153] According to Telephia, consumer billing records indicated that an estimated 41 percent of mobile subscribers used text messaging on their cellphones in the fourth quarter of 2005, 22 percent paid to access the web via their wireless device, 13 percent used multimedia messaging, and 11 percent downloaded content from their cellphones.[154]

78.   According to a May 2008 M:Metrics report, U.S. smartphone users spent an average of four hours and 38 minutes per month browsing the mobile Web.[155] As of May 2008, M:Metrics estimated that mobile browsing had increased 89 percent year over year among smartphone users in the U.S., and that page views had increased 27 percent. M:Metrics concluded that social networking and Internet commerce were drawing consumers into the mobile Web, finding that,

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[149] FCC 05-173, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Tenth Report, September 30, 2005, p. 64.

[150] FCC 05-173, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Tenth Report, September 30, 2005, p. 64.

[151] FCC 08-28, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Twelfth Report, February 4, 2008, p. 96.

[152] Until acquired by the Nielson Company in June 2007, Telephia was a respected source of data about cellphone use – tracking consumers' phone calling, mobile Web surfing, and video viewing. See, *Nielsen Adds to Cellphone Tracking*, The New York Times, June 28, 2007. http://www.nytimes.com/2007/06/28/business/media/28adco.html?_r=0

[153] FCC 06-142, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Eleventh Report, September 29, 2006, p. 72.

[154] FCC 06-142, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Eleventh Report, September 29, 2006, p. 72.

[155] FCC 09-54, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Thirteenth Report, January 16, 2009, pp. 100 – 101. The estimate is based on on-device metering of actual user behavior of those with Windows, Symbian and Palm handsets in March 2008.

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on the days they visited each site, U.S. consumers spent an average of 22 minutes on Craigslist, 29 minutes on eBay, 16 minutes on MySpace, 14 minutes on Facebook and 18 minutes on Go.com.[156]

79.   Wireless broadband technology continued to advance during the late 2000s. For example, LTE technology was commercially introduced in December 2009 by TeliaSonera in Norway and Sweden, and came to the U.S. in 2010.[157] In 2010, for example, Verizon Wireless introduced 4G LTE,[158] with download speeds four to five times faster than 3G networks, which rivaled some home broadband connections.[159]

80.   The FCC relied upon data prepared by analysts at Credit Suisse First Boston ("Credit Suisse") estimating the number of U.S. mobile wireless data subscribers and mobile wireless data penetration rates. According to these estimates, there were 180 million mobile data subscribers at the end of 2009, which translates into a penetration rate of 63 percent. **Figure 12** below is a summary of the data collected by Credit Suisse.

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[156] FCC 09-54, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Thirteenth Report, January 16, 2009, pp. 100 - 101.
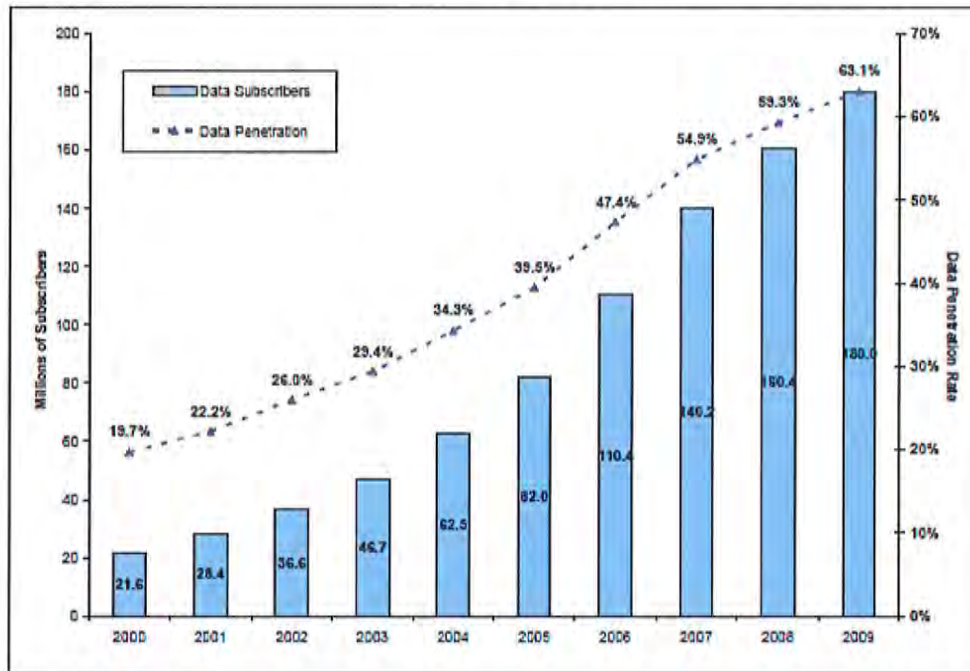
[157] 4G LTE: Here and Abroad, Verizon News Center, June 27, 2013.

[158] 4G LTE: Here and Abroad, Verizon News Center, June 27, 2013.

[159] What is 4G LTE and Why it Matters, Verizon News Center, April 30, 2012.

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Figure 12

**U.S. Data Subscribers and Data Penetration Rates**[160]

81.   These newer, faster technologies likewise continued to drive demand for data-related applications. **Figure 13** below illustrates the percentages of smartphone users who accessed the 15 most popular mobile applications and websites as of August 2014. For example, **Figure 13** indicates that, as of August 2014, 67.7 percent of smartphone users accessed weather-related websites and/or applications, 59.2 percent of smartphone users conducted Internet searches, and 49.6 percent browsed local and world news through their smartphones.

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[160] FCC 10-81, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Fourteenth Report, May 20, 2010,pp. 94 – 95 (Data provided by Credit Suisse First Boston).

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Figure 13

Mobile Apps and Websites Accessed by Smartphone Users in August 2014[161]
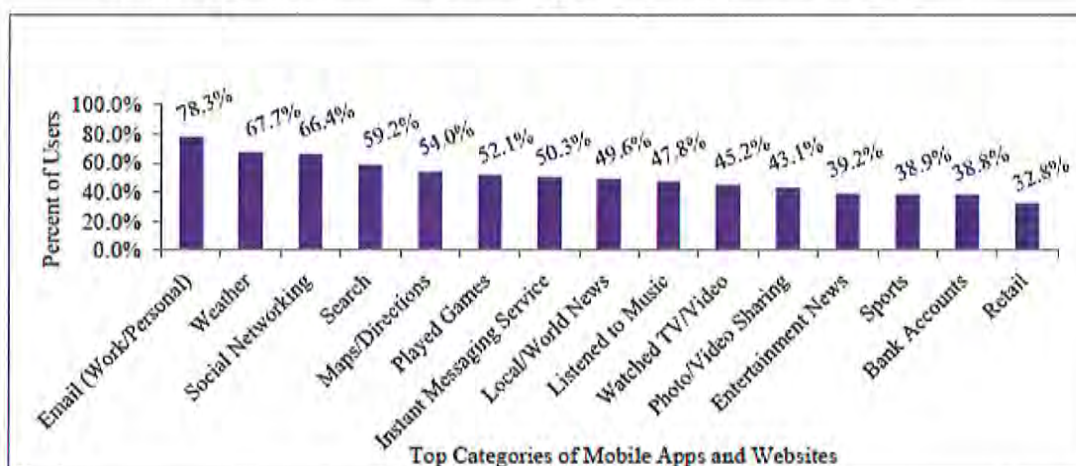
7.2.3   Growth of International Mobile Data Usage and Applications

82.   The U.S. was initially behind other countries in Western Europe and Asia with respect to mobile penetration rates. The U.S. was also initially behind Western European countries in the adoption of 3G enabled devices, but like the wireless penetration rates, the U.S. caught up.[162]

83.   A 2007 survey that focused exclusively on mobile web browsing behavior performed by mobile media research firm M:Metrics indicated that the percentage of mobile subscribers who use their cellphones to browse the mobile Web for news and information is slightly higher in the United States (10.7 percent) than in Europe (8.8 percent), and that a higher percentage of U.S. mobile subscribers use their cellphones for mobile web browsing in each individual category of information investigated, including sports, news, entertainment, maps and directions, financial account access, financial news, business directories and travel."[163]

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[161] FCC DA 14-1862, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Seventeenth Report, December 18, 2014, p. 43.

[162] FCC 09-54, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Thirteenth Report, January 16, 2009, pp. 104, 107; http://www.mobilemarketer.com/cms/ news/research/2748.html.

[163] FCC 08-28, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Twelfth Report, February 4, 2008, p. 106.

84. ComScore, Inc.[164] estimated that 28.4 percent of U.S. mobile subscribers had 3G devices in mid-2008.[165] This compares with an average of 28.3 percent of mobile subscribers in the five largest Western European countries (Germany, Spain, France, Italy and the United Kingdom).[166] ComScore reported that the only individual major European countries exceeding the U.S. in penetration of 3G enabled devices were Italy (38.3 percent) and Spain (37.2 percent).[167]

85. According to the FCC, by 2008, "[t]he percentage of mobile subscribers who use their cellphones for web browsing was slightly higher in the United States than in Western Europe, and there were broad similarities in the types of information accessed by American and Western European mobile subscribers."[168]

86. Penetration of mobile data services among mobile telephone subscribers varies by country and by type of application. A July 2008 report by Nielsen Mobile ("Nielsen") indicated that the U.S. led among 16 countries in mobile Internet penetration with 15.6 percent of wireless subscribers, followed by, among others, the United Kingdom, (12.9 percent), Italy (10.9 percent), Spain (10.8 percent), France (9.6 percent), and Germany (7.4 percent). Similarly, M:Metrics found that the percentage of mobile subscribers who use their mobile phones for certain content and applications – in particular, accessing news and information via a browser, accessing downloaded applications, purchasing ringtones, using e-mail, and accessing social networking sites – is somewhat higher in the U.S. than in other Western European countries included in the M:Metrics survey with the exception, in the case of some of these applications, of the United Kingdom. However, other mobile data applications continue to be more widely used by mobile subscribers in Western Europe than in the U.S., including phone and video messaging, watching video, and listening to music.[169]

87. **Figure 14** below illustrates the penetration rates of various mobile data services by country based on M:Metrics estimates for the three-month period ending March 31, 2008.[170]

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[164] comScore, Inc. is a global media measurement and analytics company that makes audiences and advertising more valuable across all screens that matter. According to comScore, it helps media buyers and sellers understand and make decisions based on how consumers use different media, such as TV, video, mobile, desktop and more. http://ir.comscore.com/releasedetail.cfm?ReleaseID=944439

[165] FCC 09-54, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Thirteenth Report, January 16, 2009, p. 107.

[166] FCC 09-54, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Thirteenth Report, January 16, 2009, p. 107.

[167] FCC 09-54, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Thirteenth Report, January 16, 2009, p. 107.

[168] FCC 08-28, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Twelfth Report, February 4, 2008, p. 10.

[169] FCC 09-54, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Thirteenth Report, January 16, 2009, pp. 107 – 108.

[170] FCC 09-54, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Thirteenth Report, January 16, 2009, p. 109.